Table of Contents

Safety Information ---------- **1**

Chapter 1 Installation ---------- **3**

Installation Procedures ---------- 4

Probe calibration ---------- 9

DS-1000 series Calibration ---------- 11

Chapter 2 Operations ---------- **12**

Window ---------- 13

Operation ---------- 14

Channel Switch Button ---------- 14

VOLTS/DIV Knob ---------- 14

TIME/DIV Knob ---------- 14

Threshold ---------- 15

Channel ---------- 15

Trigger Position ---------- 15

Scroll Bar ---------- 16

Panel Sizing Knob ---------- 16

Zoom(TravelScope only) ---------- 16

Waveform operation ---------- 17

Chapter 3 Main Function Button ---------- **18**

Run/Stop ---------- 18

FORCE TRIGGER ---------- 18

SET LEVEL TO 50% ---------- 18

HARDCOPY ---------- 18

TRIGGER ---------- 19

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DISPLAY ---------- 30

CURSOR ---------- 38

MEASURE ---------- 39

UTILITY ---------- 41

SAVE/RECALL ---------- 47

ACQUIRE ---------- 49

AUTOSET ---------- 52

Chapter 4 How to stack multiple DSOs ---------- 53

How to stack multiple DSOs ---------- 54

APPENDIX ---------- 57

Probe Specification ---------- 57

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Safety Information

Please review the following safety information to avoid injury and prevent damage to the DSO or any products connected to it.

Symbol definitions:

⚠	This symbol indicates that the manual should be referred to.
⚠ **WARNING**	"WARNING" denotes that, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning until the indicated conditions are fully understood and met.
⚠ **CAUTION**	"CAUTION" denotes that, if not correctly performed or adhered to, could result in damage to or destruction of DSO. Do not proceed beyond a caution sign until the indicated conditions are fully understood and met.
NOTE	"NOTE" denotes that refer to the manual, which provides operational information of which the user should be aware.

⚠ WARNING

- **Do not operate without cover(s).**

  Do not operate the DSO with any cover(s) removed. This may result in electric shock or fire hazard if any part(s) inside is touched.

- **Use USB2.0 power only**

  The DSO **should be** powered by the PC's USB2.0 port. Use **only** the DSO USB cable to connect to the PC's USB2.0 port.

- **Do not operate in wet or damp conditions.**

- **Do not modify or operate the DSO if there was any suspected damage, have it**

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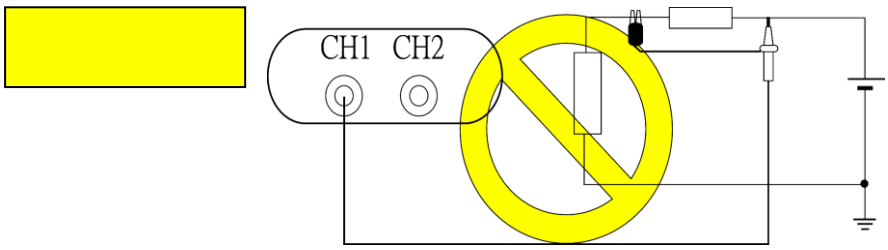
inspected by qualified service personnel.

- **Connect the Probe Properly**

  Connect the ground lead of the probe to earth ground only. Do not connect the ground lead to an elevated voltage.

  Do not connect or disconnect probes or test leads while they are probed to a voltage source.



⚠CAUTION

- **Observe ALL Terminal Ratings.**

  To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

- **Do not operate in the following installation location**
  - In direct sunlight.
  - In extremely hot and/or humidity areas.
  - With always mechanical vibrations.
  - Around areas with strong lines of magnetic forces or impulse voltage.

- **Remove the USB cable from the DSO if it is not being used.**

- **The temperature of the DSO increases after being used for a while.**

- **Use original USB cable.**

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Chapter 1 Installation

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Installation Procedures

Driver Installation for Windows XP

Insert the installation CD and connect the DSO with your PC.

Enter the hardware wizard when the Windows OS find an USB device (Figure 1) and check "yes. This time only".

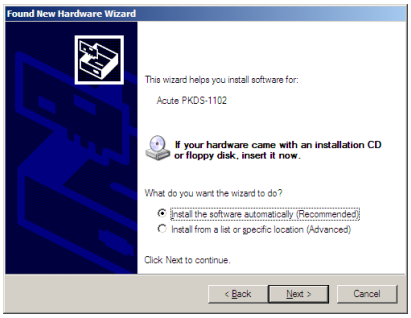
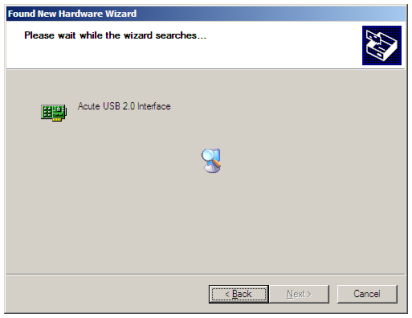


Figure 1 **Figure 2**

Choose "Install the software automatically" (Recommended) to find the proper driver automatically (Figure 2). Click "Next".

Click "Next" when a driver is found.



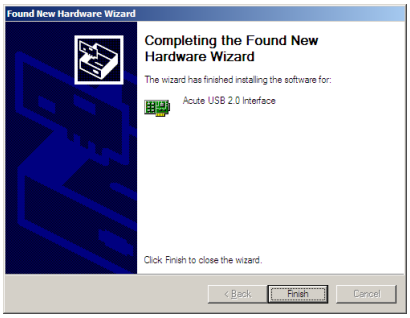


Figure 3 **Figure 4**

You will see the "Acute USB 2.0 Interface" in the Device Manager (Figure 6). Please check our FAQ at www.acute.com.tw or e-mail us at service@acute.com.tw if there is any installation problem.

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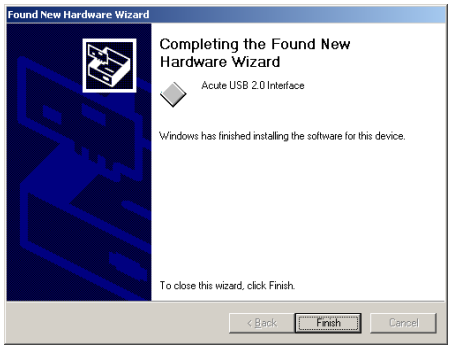

Figure 5

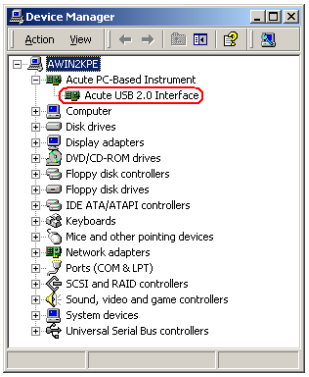

Figure 6

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Install the driver manually

Insert the installation CD and connect the DSO with your PC. Choose “Add Device” in the Control panel (Figure 1).

Figure 1 **Figure 2**

Choose “Install from a list or specific location (Advanced)” (Figure 2) and click “Next”.

Choose “Search for the best driver in these locations” (Figure 3); select the DSO directory and click “Next”.

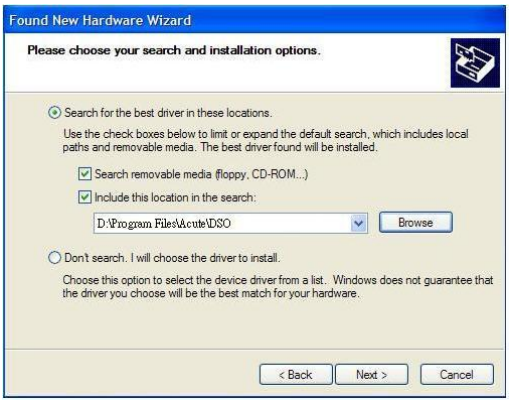

Figure 3 **Figure 4**

Click “Continue Anyway” (Figure 4) to continue the installation procedure.

Click “Finish” (Figure 5) after the DSO driver is installed. You may see the “Acute USB 2.0 Interface” in Device Manager (Figure 6).

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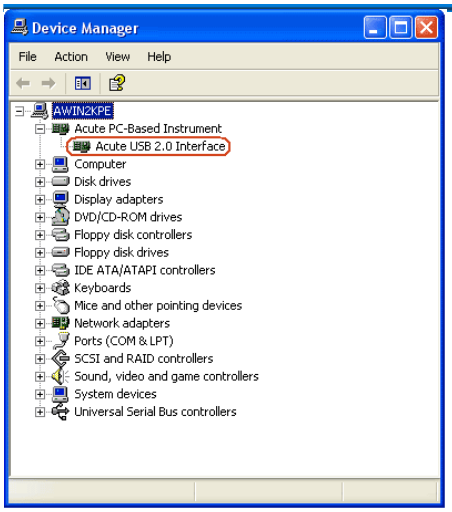

Figure 5

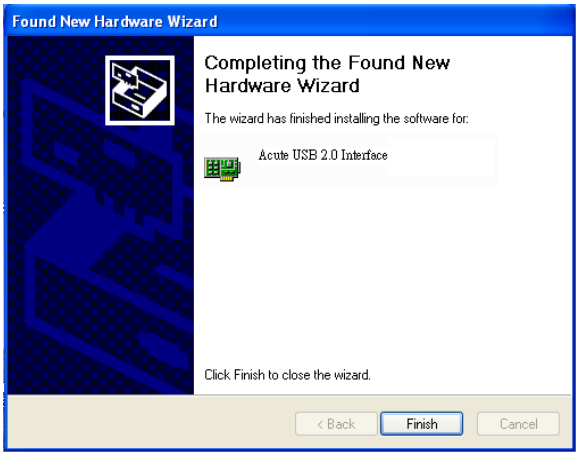

Figure 6

You will see the “Acute USB 2.0 Interface” in the Device Manager (Figure 6). Please check our FAQ at www.acute.com.tw or e-mail us at service@acute.com.tw if there is any installation problem.

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Install the DSO software

Insert the installation CD into your PC.

Double click the auto-installation procedure. Run setup.exe at the CD-ROM root directory if the auto-installation does not work. The DSO software will enter DEMO mode if the DSO is not connected with the PC.

You will find the DSO software icon ( )after the installation.

If the DSO software enters “DEMO Mode” when the DSO is connected with your PC, please check the USB cable or e-mail us at service@acute.com.tw.

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Probe calibration

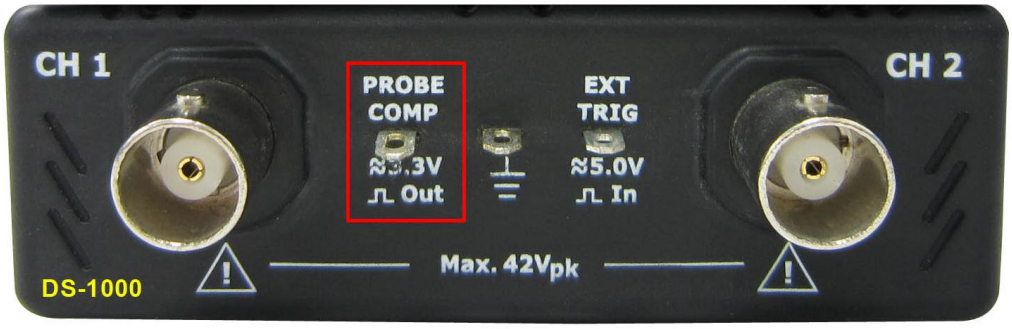
Please calibrate the two probes at the first time use.

Connect the two probes with DSO's 2 channels.

Switch the Probe to "x10".

Connect two probe ground pins with the DSO's ground terminator.

DS-1000: Connect two probes with the "Probe Comp. (3.3V)" pin.



TravelScope: Connect two probes with the "GEN 1" pin.

Run the DSO software.

Set the Volt/div = 2v and the Time/div = 500us.

If you see the waveforms below, please follow step (8).

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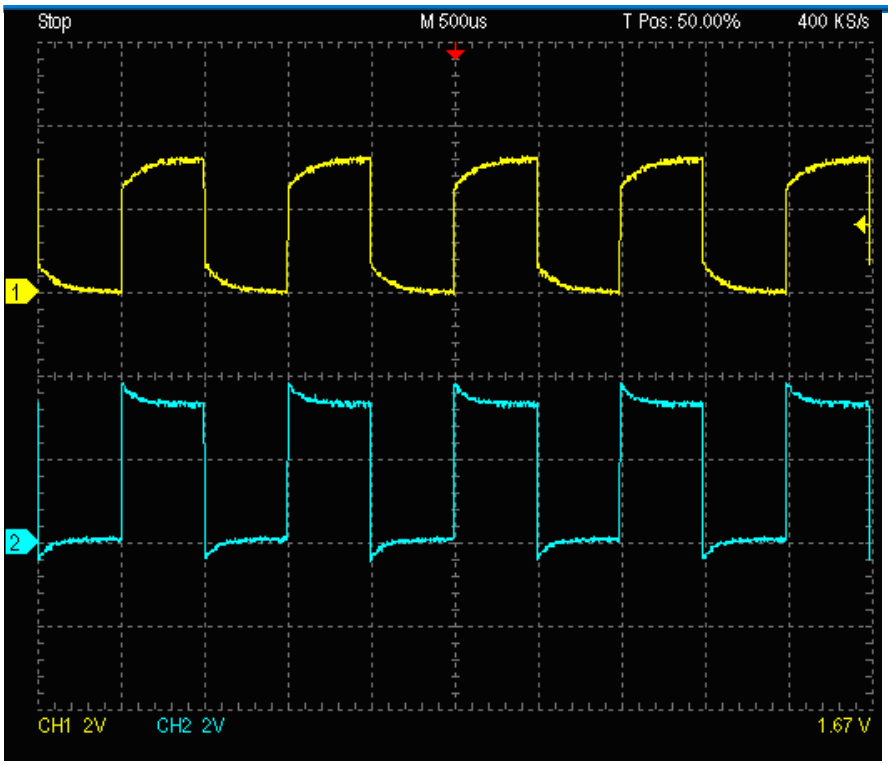
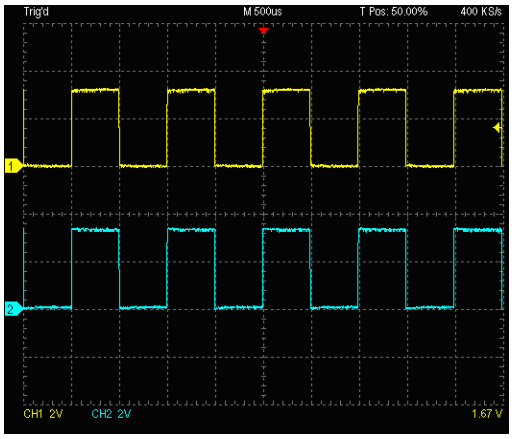


Adjust the trimmer near the probe's BNC connector and modify the waveform to the following shapes.



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DS-1000 series Calibration

Please calibrate the DS-1000 whenever the DSO connected with a different PC. Connect the two probes with DSO's 2 channels.

Switch the Probe to "x10".

Connect two probes with the DSO's ground terminator.

DS-1000: Connect two probes with the "Probe Comp. (3.3V)" pin.

Switch the Probe to "REF" position.

Push the "Utility" button.

Push "Calibration" of Function Button.

The calibration software will ask you to switch the Probe to"x10".

You can change the time base or vertical division after the calibration to check the result.

You need to calibrate the DSO again each time you use a different PC because the calibration information is stored in the PC.

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Chapter 2 Operations

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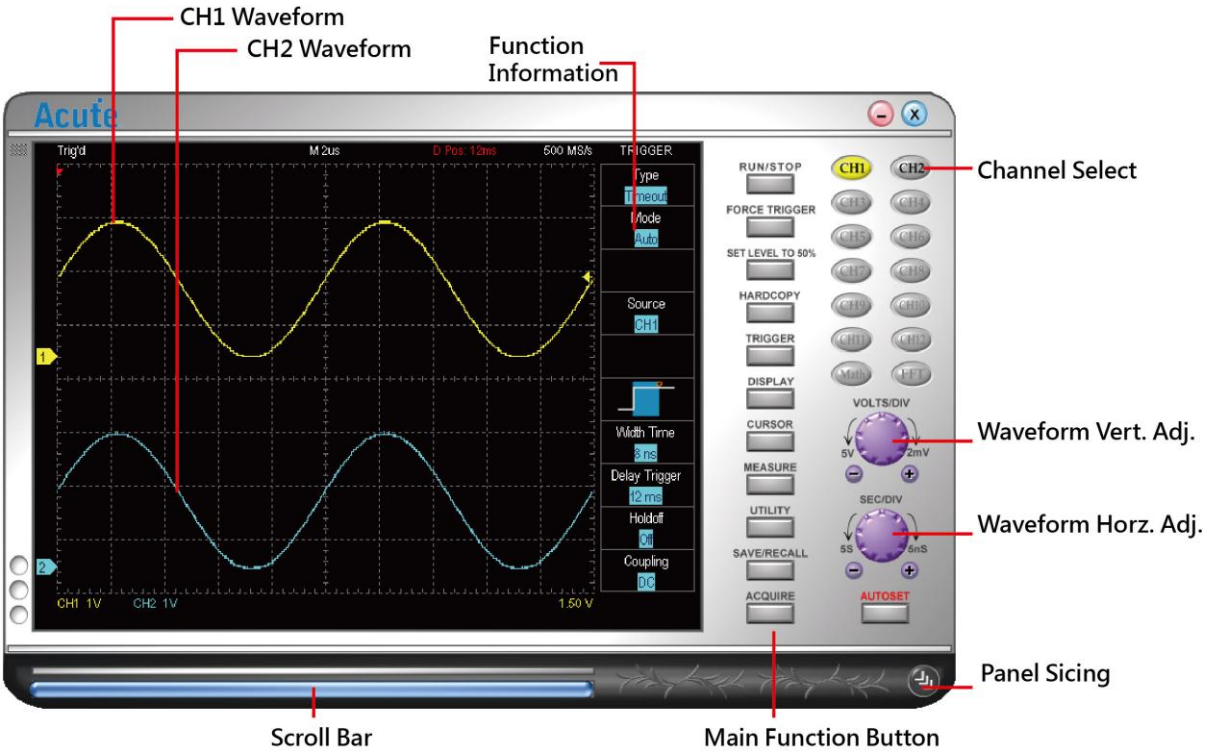
Window



You can use the mouse wheel to zoom in and zoom out the waveform on the screen and use the left mouse button to drag and flicker the waveform. You can also use the mouse right amount of measured specific area of the waveform.

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Operation

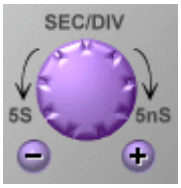
Channel Switch Button

There are 12 channel buttons (CH1, CH2…, CH12) on the upper right of the DSO software window. When you use one DSO, only CH1 and CH2 are available and the rest channel buttons will be disabled in gray color. CH1, with gray button and black fonts, is available but not activated; CH2 is in blue color when activated. Each activated channel button has its own color which is identical to that of its waveform. Click the channel button will turn on the display of the channel on the waveform window and right-click to turn it off.

VOLTS/DIV Knob

The VOLTS/DIV knob is used to change the voltage scale. There are 8 vertical divisions for the voltage scale on the software window and the voltage scale is shown on the window's lower-left corner.. For example, the window will display "CH1 2.00V"if the voltage scale is 2 Volts for each vertical division and the total voltage of all 8 vertical divisions are 16 Volts. There are two small buttons under the VOLTS/DIV knob, one is "-"(zoom out) and the other is "+" (zoom in). The mouse wheel can be used to adjust the voltage scale faster.

TIME/DIV Knob



The TIME/DIV knob is used to change the time scale. There are 10 horizontal time divisions on the waveform window. When the TIME/DIV shows "M 50us", it means each horizontal division is 50us. There are two small buttons under the TIME/DIV knob, one is "–" (zoom out) and the other is "+" (zoom in)

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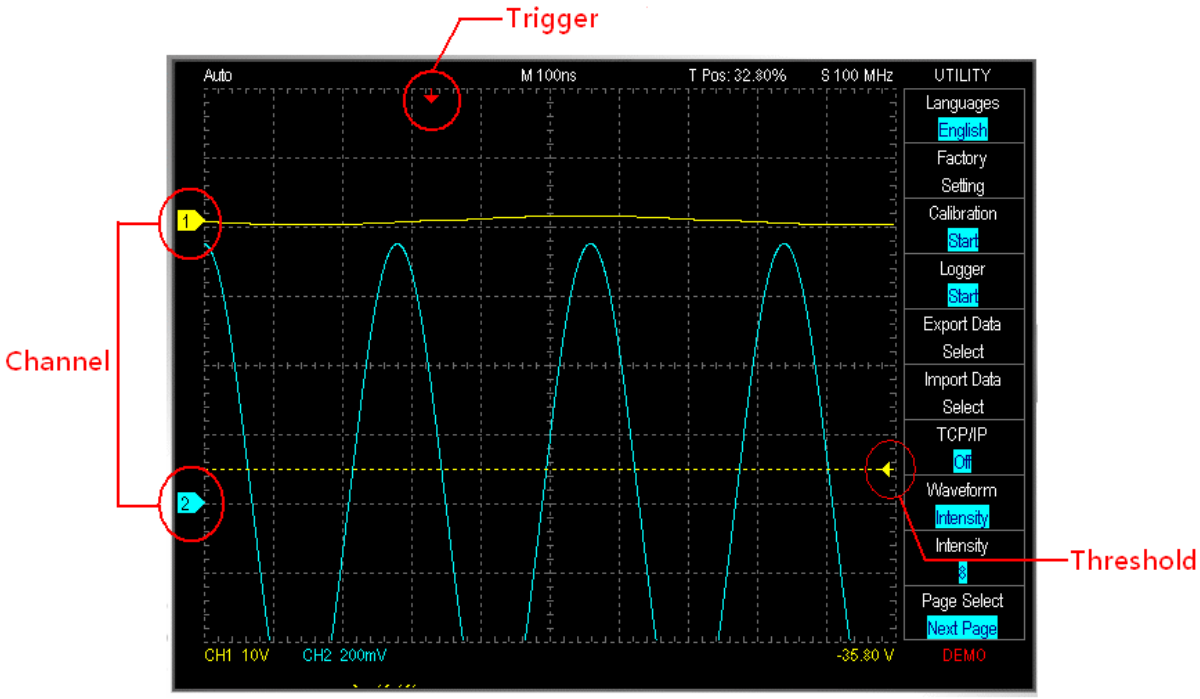
to change the time scale, or use the mouse wheel to zoom in / zoom out. The waveform can be drag and flicker by mouse left button.

The mouse wheel can be used to adjust the time scale faster.

Threshold



Threshold is an arrow sign on the right of the waveform window. You can move the arrow to adjust the threshold value that is shown, on the lower right of the waveform window.

Channel

The channel numbers are shown on the left of the waveform window; you may move the channel to adjust its threshold.

Trigger Position

The trigger is a red arrow sign on the top of the waveform window; you can drag the trigger sign to adjust its time.

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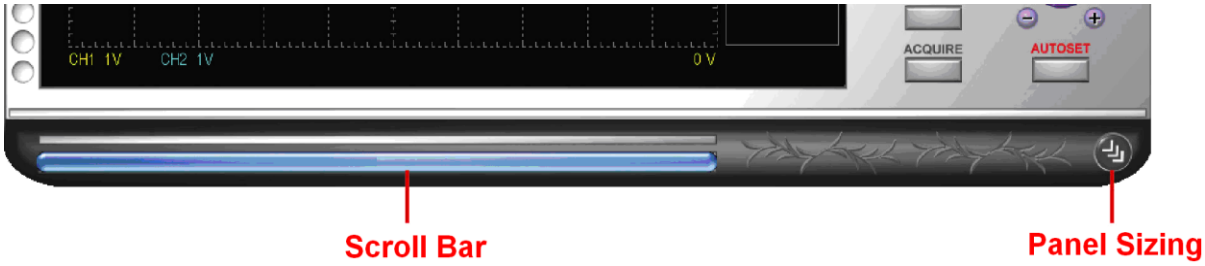
Scroll Bar

The scroll bar is a light blue line under the waveform window. You can move the waveform or the scroll bar to see the waveforms in different time or you can double click the scroll bar to move the waveforms to the center (50%) of the time

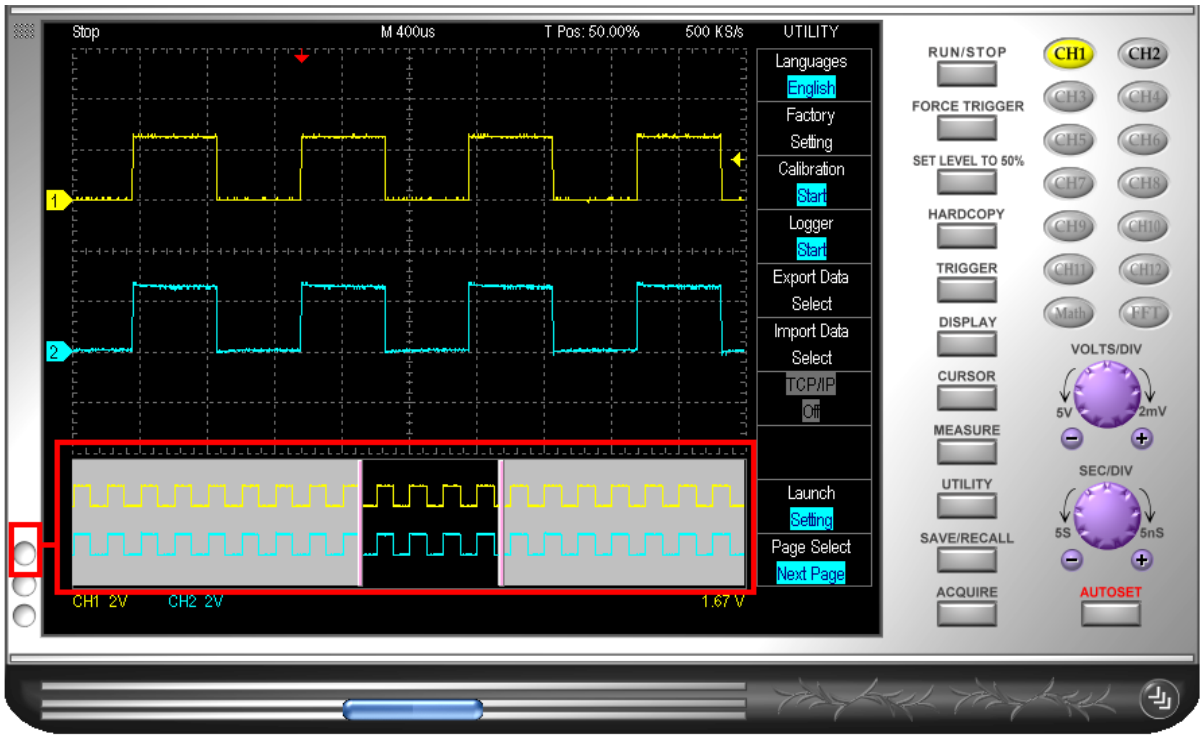


Panel Sizing Knob

You can move the panel sizing knob on the lower right of the panel to adjust the size of the panel.

Zoom(TravelScope only)

Press the button to on/off the zoom window; also use the hot key (z) to on/off it.



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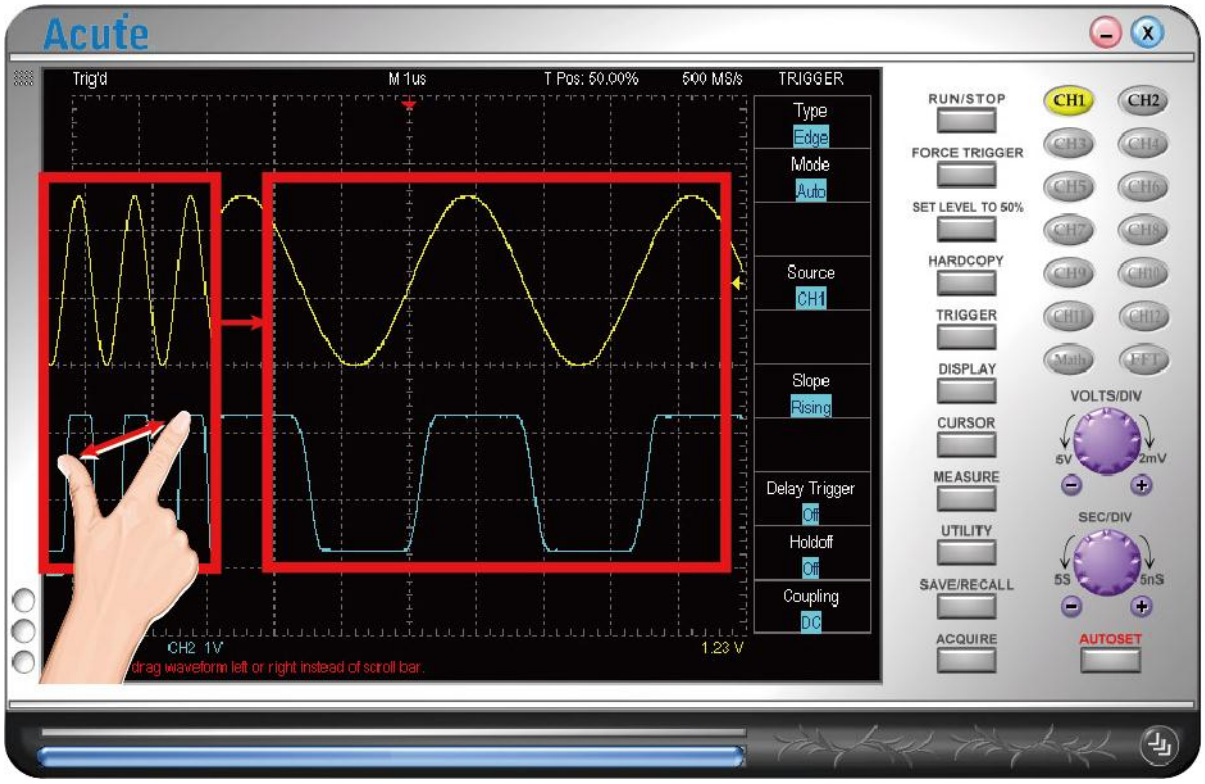
Waveform operation

Support multi touch.



Easy display of the waveform: You may drag the waveforms or roll the mouse wheel to zoom in/out the waveforms.

Fast measurements: Right-click the selected waveform area for its measurements.

Fast voltage offset: Right-click the selected waveform area for its voltage offset

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Chapter 3 Main Function Button

You may click each sub function button to activate the function

Run/Stop

RUN/STOP icon starts/stops the acquisition process. The DSO also has a black hardware RUN/STOP button which does the same function.

FORCE TRIGGER

When the DSO can not trigger in the Normal or Single Shot trigger mode, then press the "FORCE TRIGGER" button to force the DSO to trigger the signal.

SET LEVEL TO 50%

Click the "SET LEVEL to 50%" button to set the threshold to the 50% of the signal's Vpp.

HARDCOPY

Click the "HARDCOPY" button to print the waveforms. Select "Utility" → "export" to preview the waveform.

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TRIGGER

Type \ Model	DS-1002/DS-1102	DS1202/DS-1302	TravelScope E serial	TravelScope A/H serial
Edge	●	●	●	●
Video		●	●	●
Width			●	●
Runt				●
Pattern				●
State				●
Timeout				●
Transition				●
Setup/Hold				●
B-Trig.				●
B-Event				●
Window				●
I2C				●
CAN				●
UART				●
LIN				●
Delay trigger		●	●	●
Holdoff			●	●
Coupling			●	●

Trigger Type

Edge

Trigger on Rising/Falling/Either/Alternate signals

Video

Trigger on video signals like NTSC、PAL or SECAM.

Related operations:

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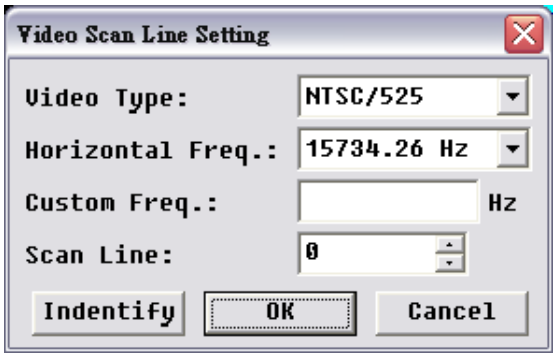
Move cursor to “Line #” and use the mouse wheel to set the scan line.

For the DS-1202 or DS-1302, “Video Trigger On” sets the trigger to One Field, Odd Field, Even Field, or a Scan Line.



Steps:

You can choose the numbers of the scan line.

Right-click and choose the video type, horizontal frequency or scan line.

Video Type: MTSC, PAL or SECAM.

Horizontal Freq.: Adjust the frequency according to the tested signal

Identify: Click **Identity** to automatically identify the video type and horizontal frequency.

Click the “Cursor” button to set the Horizontal Unit as IRE will make the video measurement easier.

Width

This is useful for observing inter-symbol-interference (ISI). Trigger when the pulse width matches the following,:

Mode:

Icon	Mode
	Positive pulse
	Negative pulse
	Any pulse

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Width time: From 1ns to 50s depending upon different width mode and sampling rate.If the width time condition is set "=" or "≠", the range is ±5%.

For example: Set the width time = (≠) 100 ms, then the DSO will trigger when the pulse width = (≠) 95-105 ms.

Runt

It allows you to trigger on the unknow state in digital system. Defined by pulses that enter and exit between two defined amplitude thresholds. A runt can also be time qualified with a pulse width between 8 ns and 50 s. A runt polarity of Positive, Negative, or Either can be selected.

Mode:

Runt Mode	Width Time	Descript
		Positive pulse
		Negative pulse
		Positive or negative pulse
	1ns - 50s	Positive pulse with different width
	1ns - 50s	Negative pulse with different width
	1ns - 50s	Positive or negative pulse different width

Width time: The same as the Width trigger.

Pattern

It can trigger on any logical combination of input channels.

Mode:

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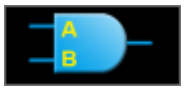
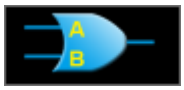
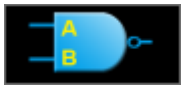
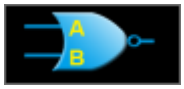
Icon	Mode
	AND
	OR
	NAND
	NOR

Trigger on any logic combination of 2 channels.(AND/OR/NAND/NOR)

Width time: The same as the Width trigger.

State

State trigger is useful when trouble shooting the parallel buses.

Mode:

Icon	Mode
	Clock rising latch
	Clock change latch

Trigger when the logic input(Source B) to be true and clock input(Source A) is rising of change edge.

Timeout

It is oftern use to trigger on the dead time of the system.

Mode:

Icon	Mode
	High
	Low

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	Either

Trigger when no pulse for a period of time, range from 1ns to 50s.

Width time: The same as the Width trigger

Transition

When edge is faster than necessary for the opernational environment can radiate trouble energy. When edge is too slow will into the circuit instability.

Mode:

Icon	Mode
	Rising
	Falling

Trigger when the time interval from the low-to-high or high-to-low thresholds is accord to a specified time. A transition can also be time qualified with a pulse width between 2 ns and 50 s.

Width time: The same as the Width trigger

Setup/Hold

Setup/Hold violations can cause data errors. It is easy to capture this error.

Mode:

Setup icon	Mode
	Setup timing violation when clock rising.
	Setup timing violation when clock falling.
	Setup timing violation when clock chang.

Hold icon	Mode

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	Hold timing violation when clock rising.
	Hold timing violation when clock falling.
	Hold timing violation when clock chang.

Trigger if the data transition within the defined setup/hold time window of the clock edge.

B-Trig

In the most demanding application a single trigger event is not sufficient to fully define the circuit behavior that creates the event of interest.

Mode:

Setup icon	Mode
	B rising after A rising
	B falling after A rising
	B rising after A falling
	B falling after A falling

Trigger on B event after A event with a delay time. The delay time can be from 2ns to 50s.

B-Event

In the most demanding application a single trigger event is not sufficient to fully define the circuit behavior that creates the event of interest.

Mode:

Setup icon	Mode
	B rising n-times after A rising
	B falling n-times after A rising

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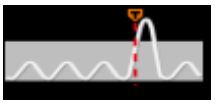
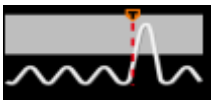
	B rising n-times after A falling
	B falling n-times after A falling

Trigger on n-th B event after A event. The number of events is up to 1024 times.

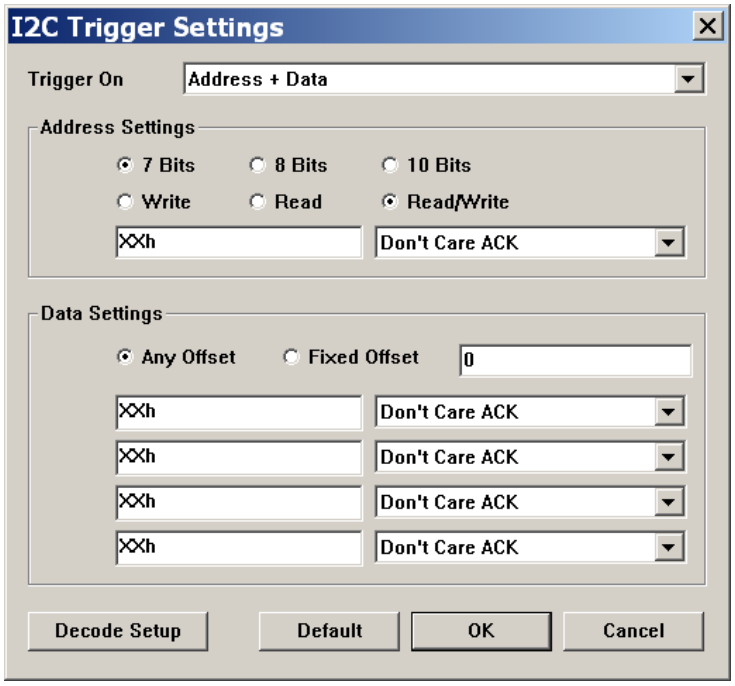
Window

Mode:

Setup icon	Mode
	***Exit window***
	***Enter window***

Triggers on an event that enter or exit a window. The window zoom is between the two thresholds.

I2C



Trigger On: Trigger mode: Start, Stop, Address, Data…

Address Settings: bit length and read/write address value. (X means don't care)

Data Settings: up to 4 conditions. Fixed Offset can trigger on the n-th data.

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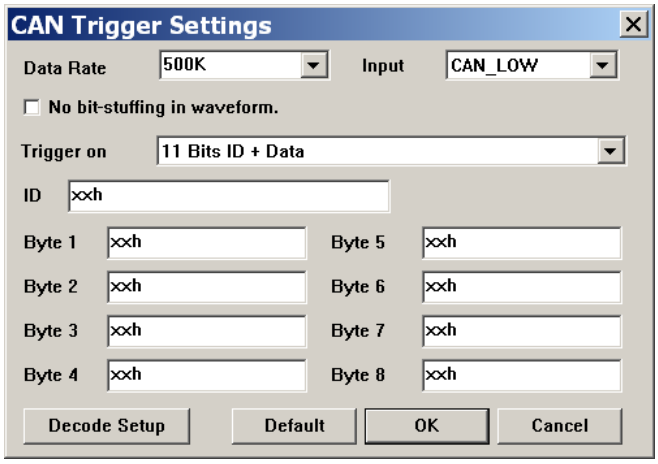
CAN



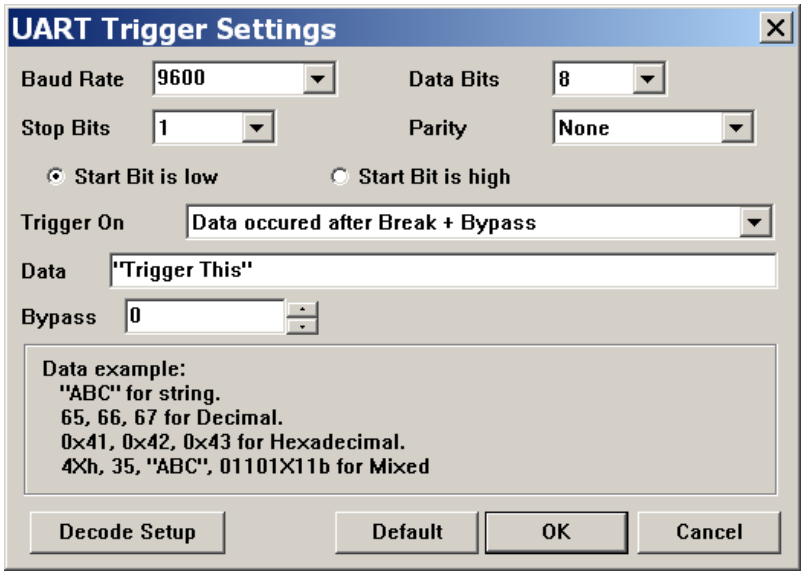
Data Rate: Select the baud rate.

Input: Select CAN_HIGH or CAN_LOW

Trigger on: select the trigger mode.

ID / Byte: trigger ID or Data byte, up to 8 data.

UART:



Baud Rate: Select the baud rate

Data Bits: From 4 - 16 bits

Stop Bits: From 1 – 4.5 bits

Parity: None,Odd,Even,Mark,Space

Trigger On: Data, Break,Parity Error…

Data: Trigger data

Bypass:

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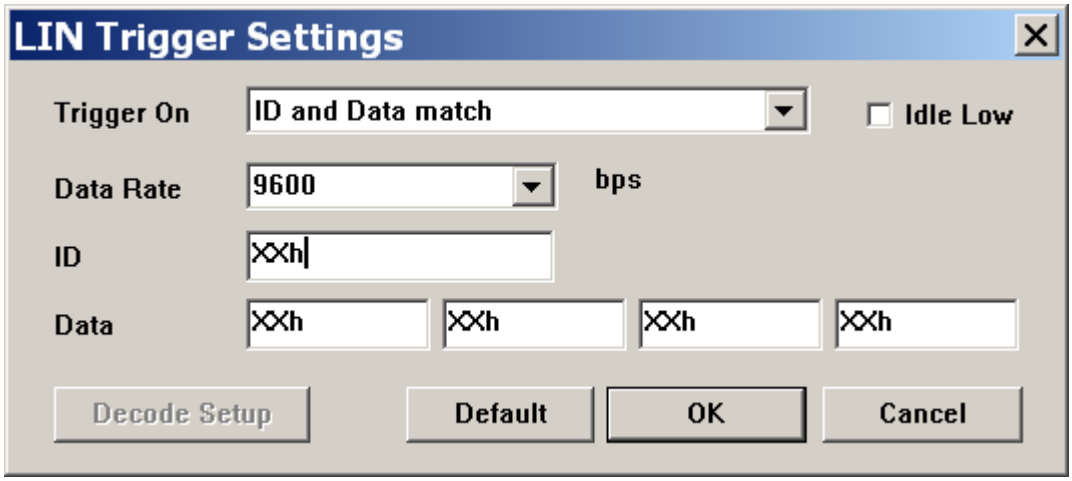
LIN



Trigger On: Start,ID,Data,Parity…

Data Rate: Select the data rate

ID/Byte: trigger ID or Data byte

Source

The channel signal is to be specified as the trigger source.

Mode

Three trigger modes: Auto, Normal or Single Shot. The record length are adjustable.

Record Length

	DSO Series	Record length
DS-1000 series	DS-1002 DS-1102	500S – 64KS
	DS-1202	500S– 512KS
	DS-1302	500S – 2048KS
TravelScope series	TS2202	10KS
	TS2212	10KS – 64MS

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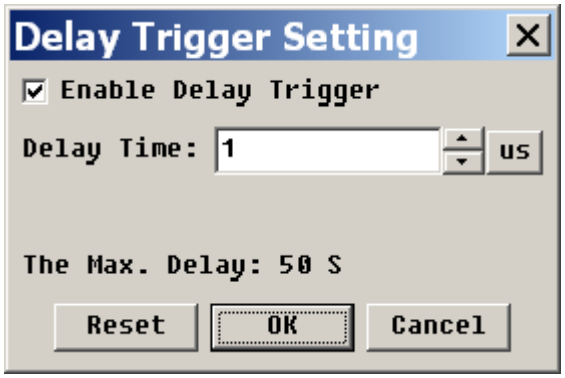
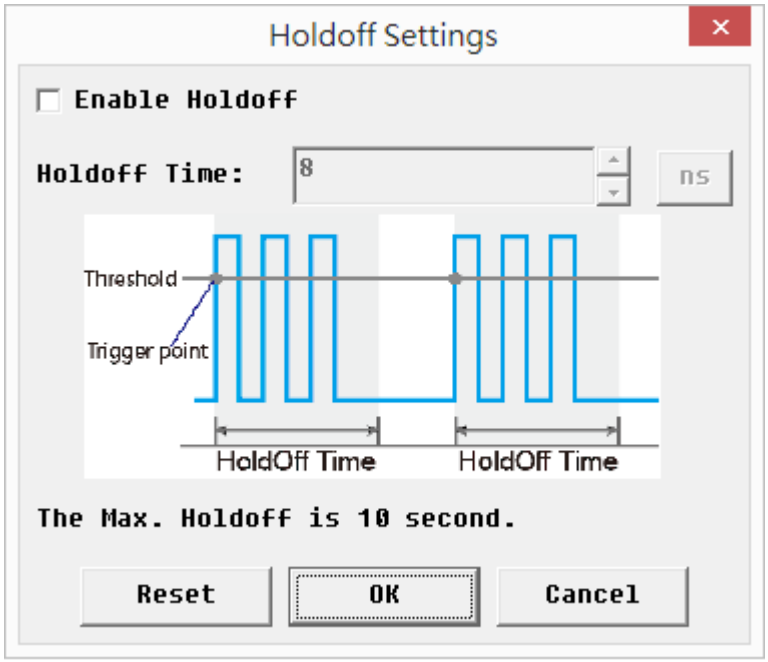
Delay trigger



The DSO can delay the trigger up to 50 seconds after the trigger condition is matched. The Delay time icon is D Pos: 1us

Holdoff Time



Stop trigger function during the holdoff time from 8ns to 150s after the trigger condition is matched

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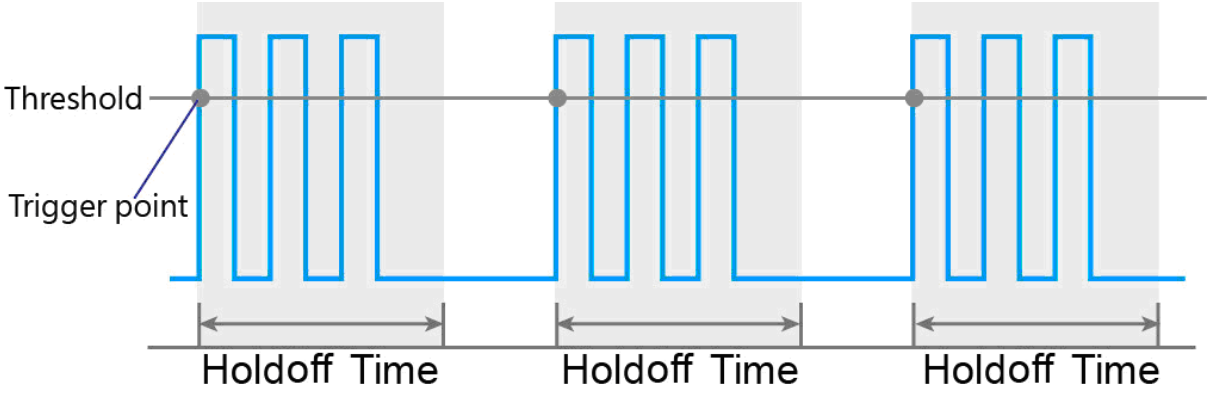

Figure: Holdoff

Coupling

Use high frequency reject (H.F. Rej.), low frequency reject (L.F. Rej.) or noise reject (Noise Rej.) to filter noises near the trigger point.

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DISPLAY

Display(1/3):

CH Display

Turn on/off to display the channel.

CH Coupling

AC, DC or GND.

CH Invert

Invert the waveform.

CH Offset (TravelScope oly)

Move the waveform vertically on this button or right-click the waveform area to set the offset parameter.

Offset	Volts/div
±150V	2, 5, 10V/div
±15V	0.2, 0.5, 1V/div
±1.5V	2,5, 10, 20, 50, 100mV/div

CH Probe

The probe option (current, x2000, x1000, 200, x100, x10 or x1) on the DSO software window must be identical with the probe.

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CH Bandwidth

This is a bandwidth limitation; if selected then the signal higher than 20 MHz (or100 MHz) will be filtered.

Display(2/3):

:

Draw Type

Draw the waveform by dots (Dot) or in line (Line).

Quick Draw

Draw the waveform quickly.

Interpolation

Use the Sinc interpolation sample points to connect the DSO waveform

Persistent

Display the new waveforms while keeping the old waveforms on the window to see the maximum difference between the waveforms

Persistence

Clear the old waveform on the window.

Decode Setting

Bus decoder for I2C, UART, CAN, ProfiBus, ARINC429, MIL-STD-1553, LIN

I^2C:

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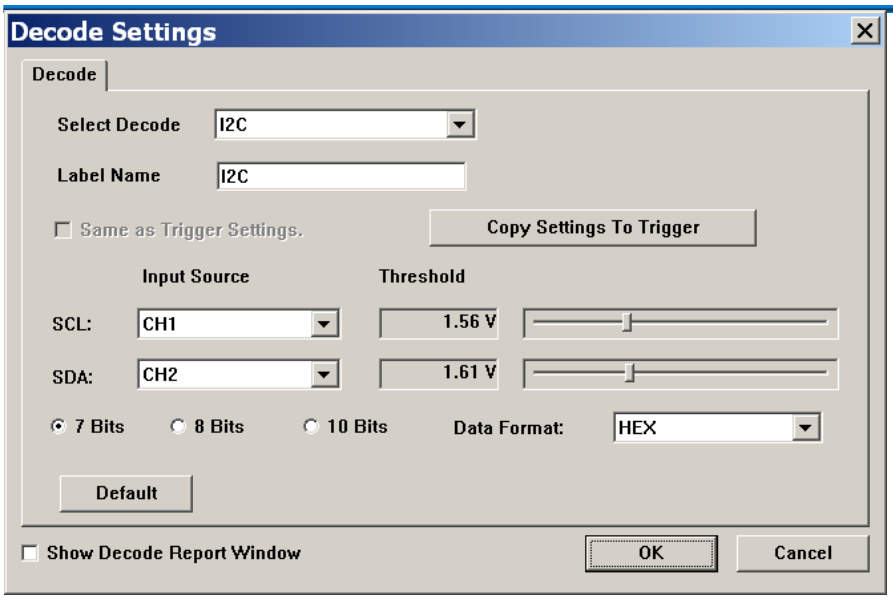


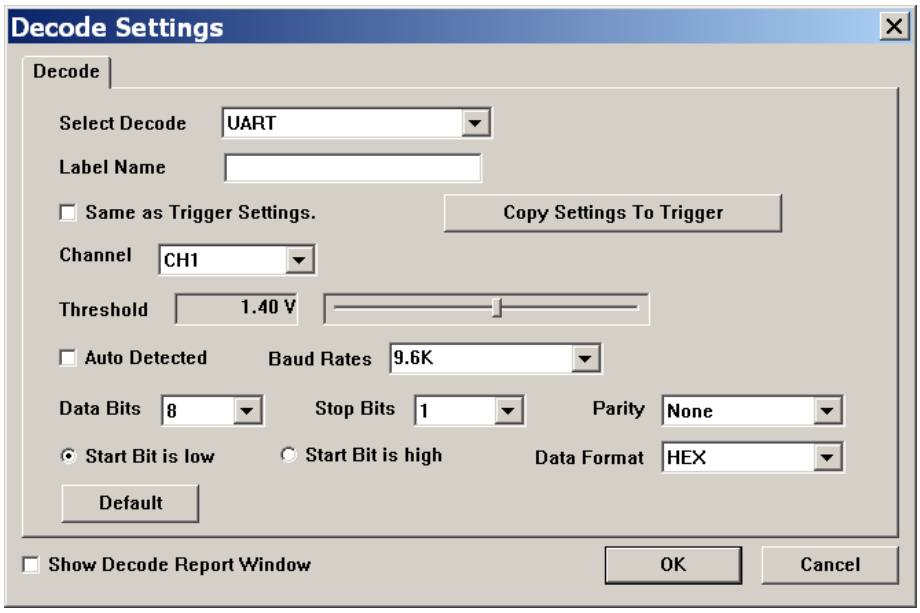
Input Source: Select I2C SCL (clock) and SDA (data) channels

Threshold: Threshold setting

7/8/10 bits: I^2C adderss length

Data Format: ASC, BIN, DEC, HEX

UART:



Channel: Select UART channel.

Threshold: Threshold setting

Baud Rates: Baud rate setting, auto baud rate setting if check “Auto Detected”

Data Bits: Data bits length

Stop Bits: Stop bits length.

Parity: None, Odd, Even, Mark, Space

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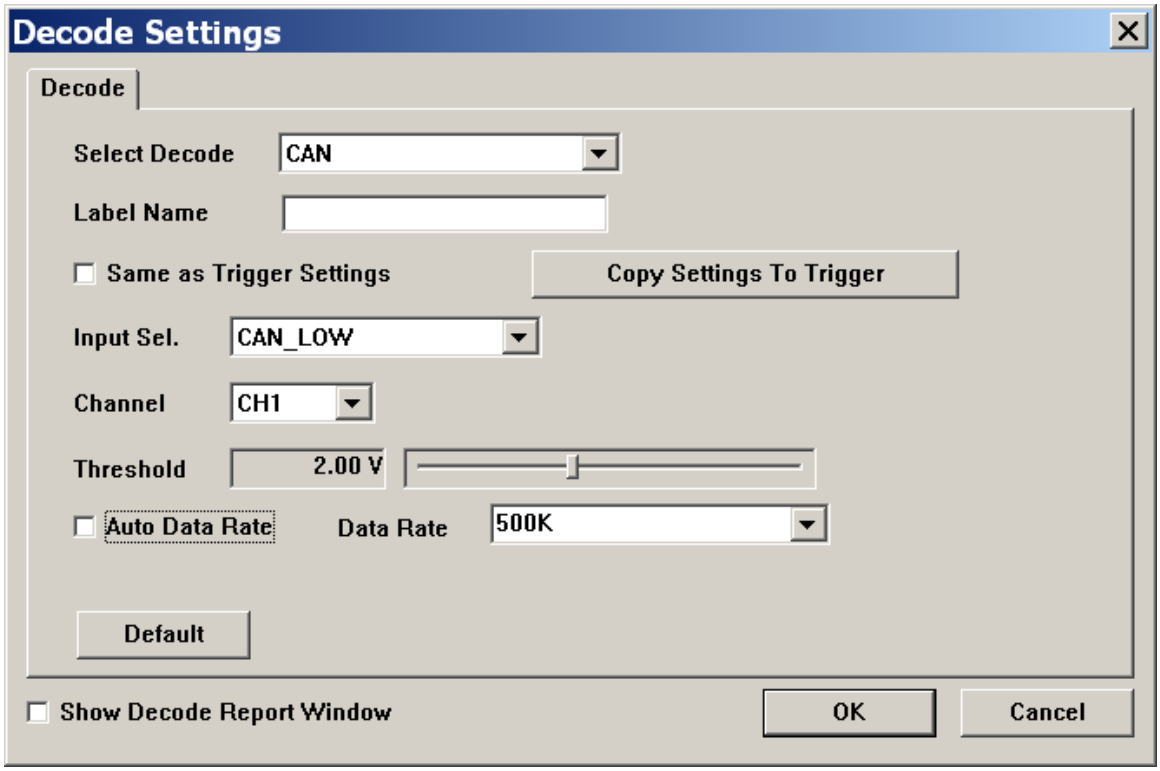
CAN:



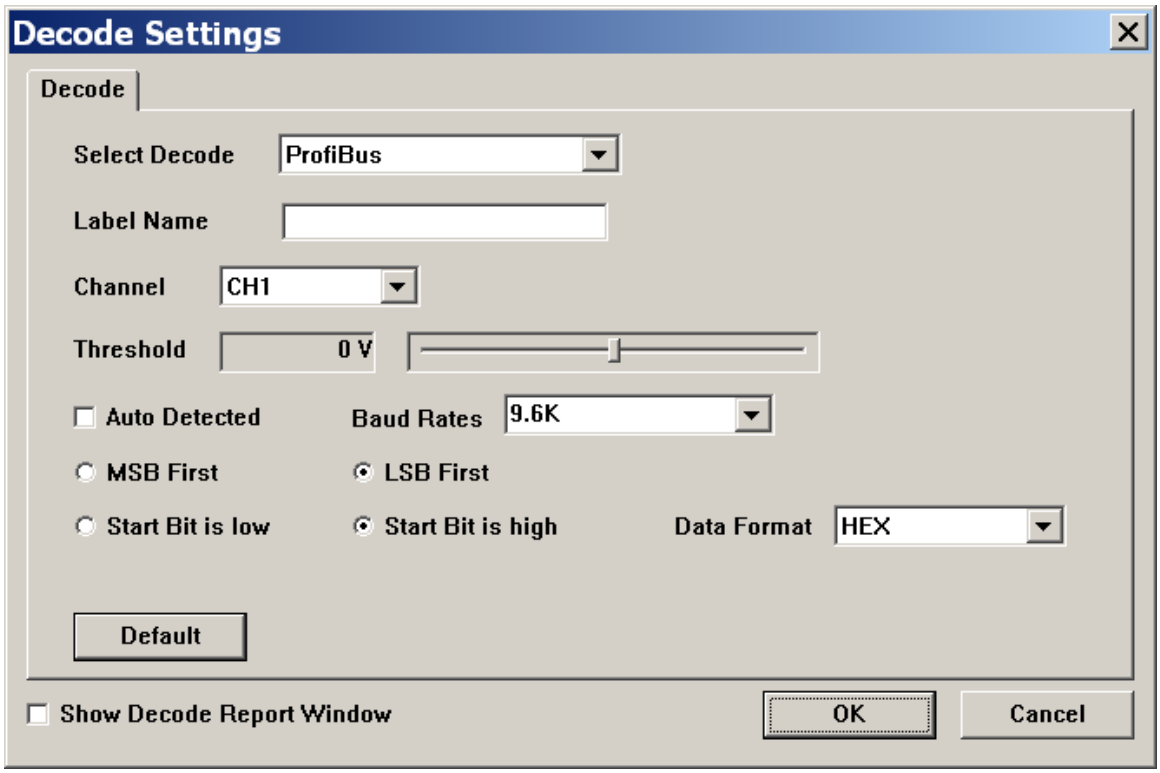
Input Sel.: Select CAN high or CAN low which was connected.

Channel: Select CAN channel, only CAN high or CAN low.

Threshold: Threshold setting

Data Rate: Data rate settinmg，auto data rate setting if check”Auto Data Rate”

ProfiBus:



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Channel: Select ProfiBus channel

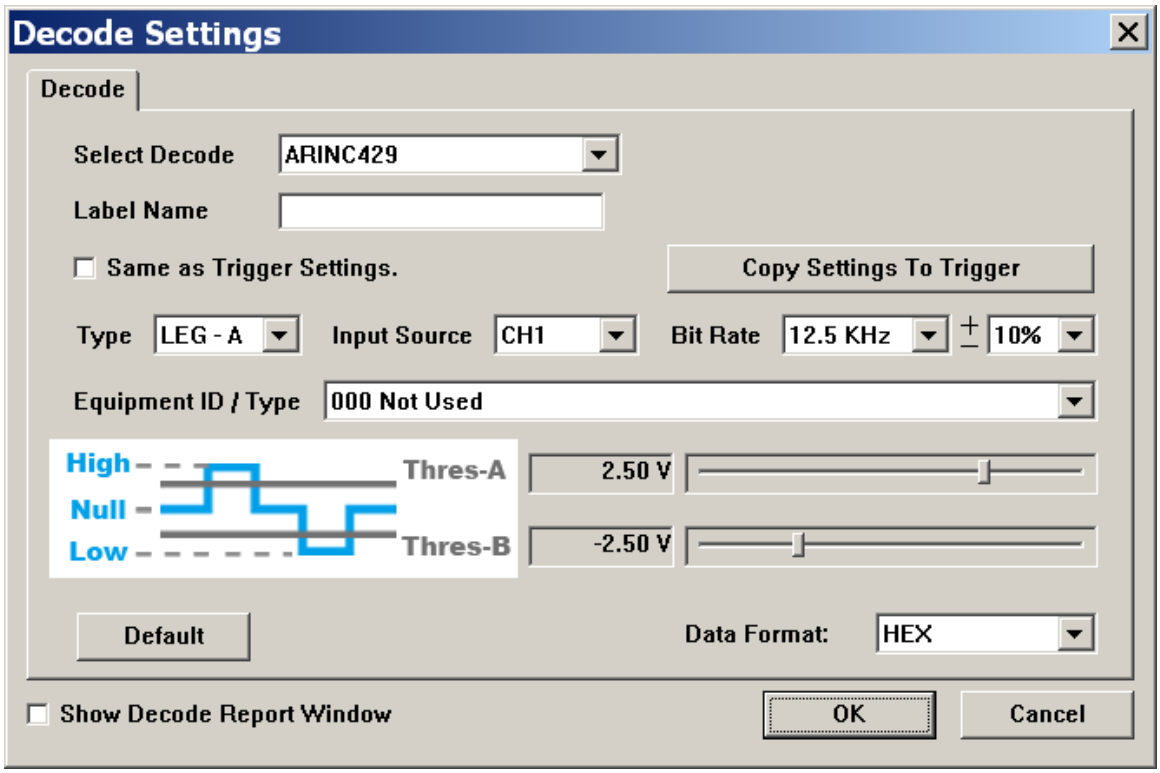
Threshold: Threshold setting

Baud Rate: Baud rate settinmg，auto baud rate setting if check”Auto Baud Rate”

MSB/LSB First: MSB or LSB

Start Bit: Sleect start bit high or low

ARINC429:



Type: LEG-A, LEG-B

Input Source: Select channel

Bit Rate: Bit rate and it’s tolerance

Equipment ID / Type: Set ID

Threshold: Threshold setting

MIL-STD-1553:

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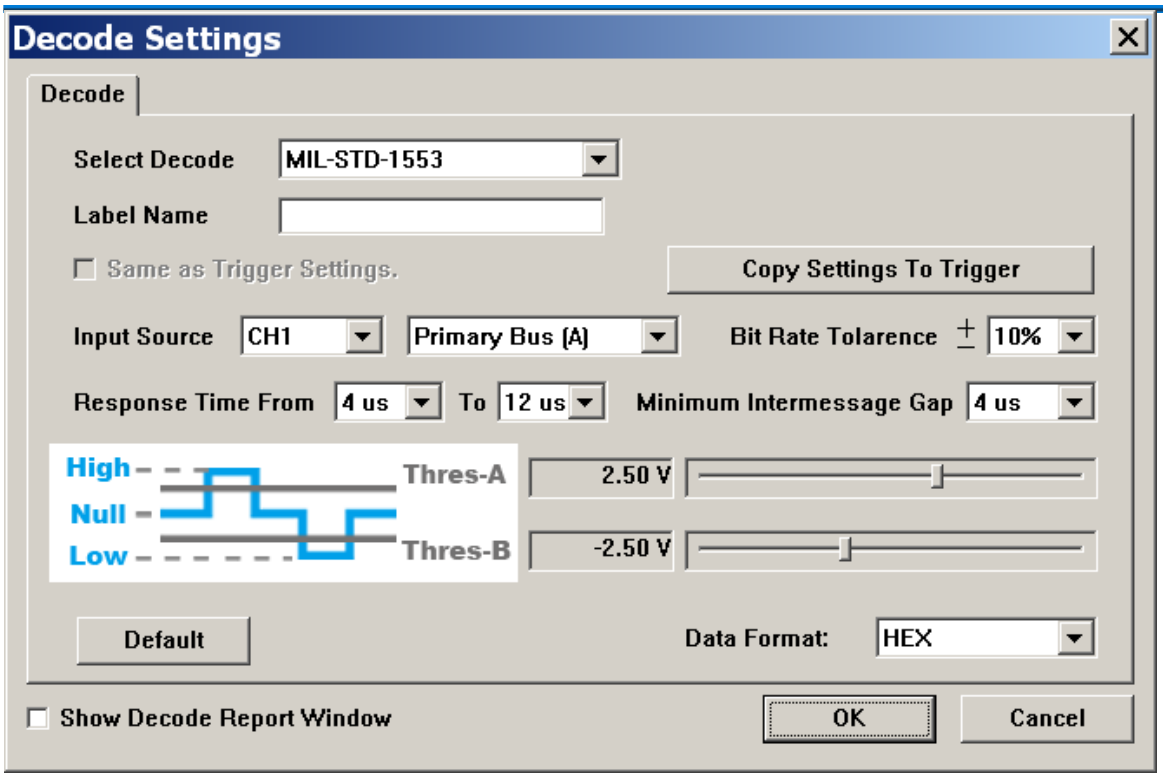


Input Source: Select channel and type

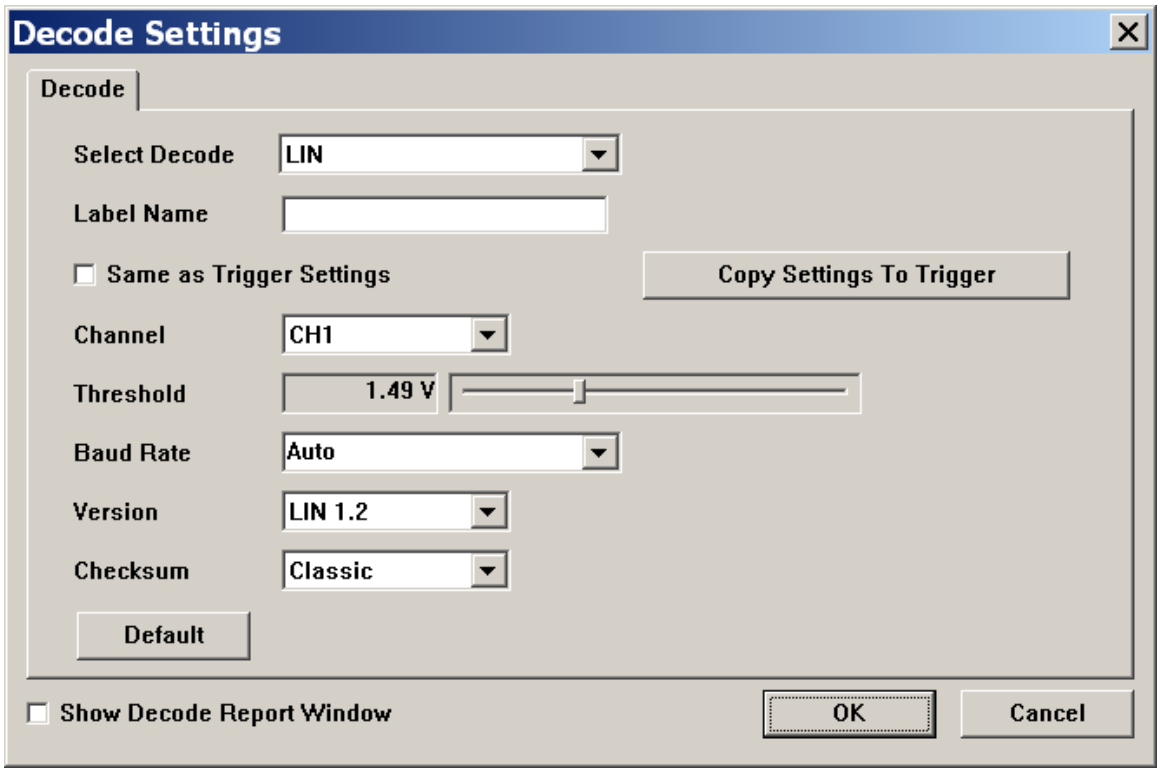
Bit Rate Tolarence: Bit rate and it's tolerance

Response Time From: Response timerange

Minimum Intermessage Gap: Minimum gap

Threshold: Threshold setting

LIN:



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Channel: Select channel

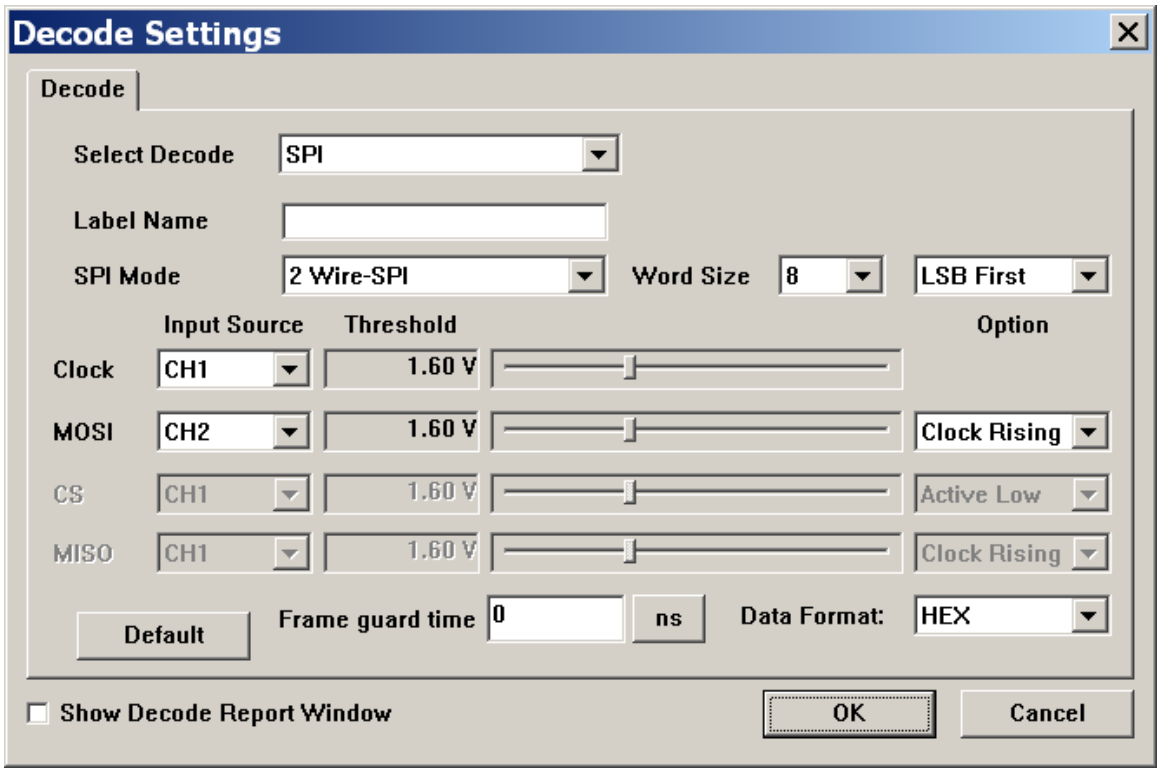
Threshold: Threshold setting

Baud Rate: Baud rate settinmg

Version: LIN 1.2/2.0/2.1

Checksum: Classic or Enhanced

SPI:



SPI Mode: 2/3/4 wire SPI

Input Source: Select channel

Threshold: Threshold setting

Option: Latch data mode

Report

Show the bus decode result as report.

Math (3/3):

:

Math

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XY, A+B, A-B, Ax B, A / B, |A|, $\sqrt{A}$, Log(A), Ln(A), e^{A}, $\int Adt$ is the mathematical result. “X-Y” is the Lissajous figure.

FFT

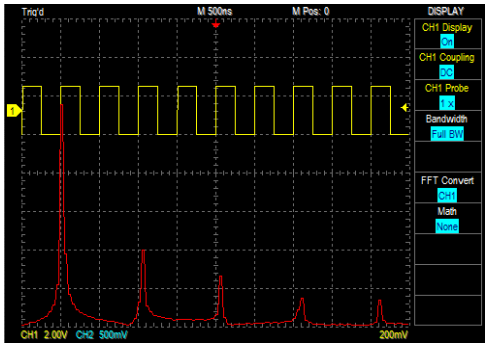
The selected channel can be transformed as FFT.

FFT Scale

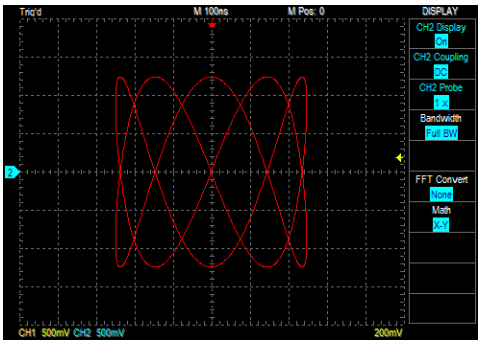
The FFT Scale has three modes: Linear RMS, dbV RMS, dBm Rms.

FFT Window

The FFT window includes “Triangular”, “Cosine”, “Lanczos”, “Gaussian”, “Rectangular”, “Blackman”, “Hann”, “Hamming” and “Harris”.



FFT



Lissajous Figures

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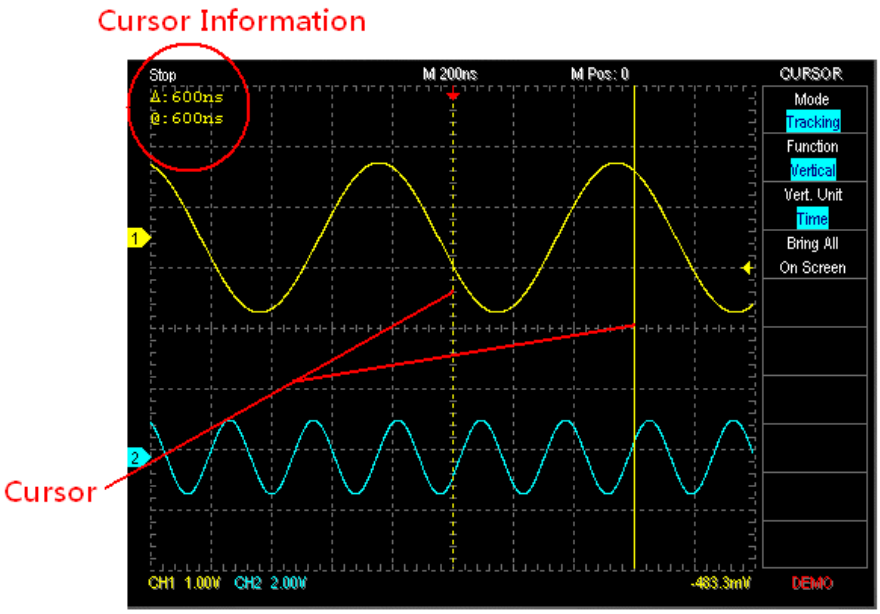
CURSOR



There are two cursors: the Time cursor (vertical line) and the Voltage cursor (horizontal line). The two lines can be displayed in one yellow solid line (when being dragged) and one yellow dashed line or both not to be displayed. There are two cursor icons: “@” and “Δ”.

“@” means the difference of time or voltage between the cursor and the Trigger point.

“Δ” means the difference of time or voltage between two cursors. Independent mode: Cursors can be moved separately.

Tracking mode: Cursors can be moved together.

When the cursor(s) is(are) out of the window, you may click the “bring all on screen” button to bring all cursors back to the window.

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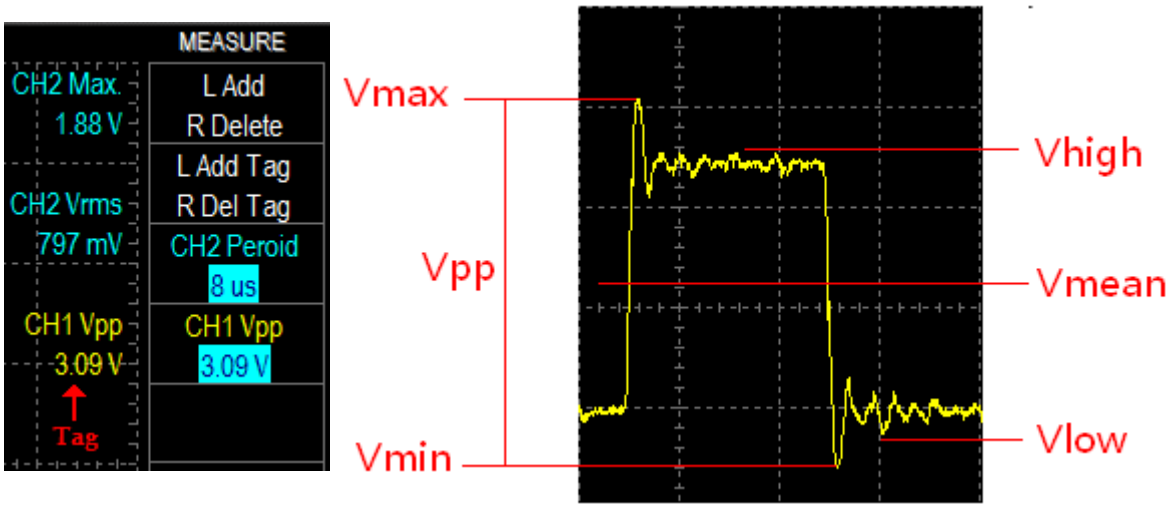
MEASURE

Click “Item Select” under Measurement and you will see a pull-down menu with the items listed below. Measurement can be displayed in the Data window or the Waveform window. “Add” and “Delete” buttons are used in the Data window to add or delete the measurement value. “Add Tag” and “Del Tag” buttons are used in the Waveform window to add or delete the measurement value.



Item	Description
Frequency	The time required to complete the first cycle in the waveform
Period	The frequency of the first cycle in the waveform
Max.	The most positive peak voltage of the waveform.
Min.	The most negative peak voltage of the waveform
High	It can be calculated using the histogram method, the most common value found above the mean.
Low	It can be calculated using the histogram method, the most common value found above the mean.
Vpp	The absolute difference between the maximum and minimum amplitude in the entire waveform.

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Amplitude	The high value less the low value measured over the entire waveform.
Vrms	The true Root Mean Square voltage over the entire waveform
Mean	The arithmetic mean over the entire waveform
+Duty	The ratio of the positive pulse width to the signal period expressed as a percentage. The duty cycle is measured on the first cycle in the waveform
-Duty	The ratio of the negative pulse width to the signal period expressed as a percentage. The duty cycle is measured on the first cycle in the waveform
+Width	The time between the mid reference amplitude points of a positive pulse. The measurement is made on the first pulse in the waveform.
-Width	The time between the mid reference amplitude points of a negative pulse. The measurement is made on the first pulse in the waveform
Rise Time	The time for the first rising edge from low reference value(10%) to high reference value(90%).
Fall Time	The time for the first falling edge from high reference value(90%) to low reference value(10%).
+Overshoot	((Max. – High) / Amplitude) x 100% in the first rising edge.
-Overshoot	((Low – Min.) / Amplitude) x 100% in the first falling edge.
Mid	(Vhigh + Vlow) / 2
Cycle Vrms	The RMS of the first cycle in the waveform.
Cycle Mean	The arithmetic mean of the first cycle in the waveform.
Rise Delay	The time between the two rising edge form different channel
Fall Delay	The time between the two falling edge form different channel
RPreshoot	((Vmin- Vlow) / (Vhigh- Vlow)) x 100
FPreshoot	((Vmax- Vhigh) / (Vhigh- Vlow)) x 100
Phase	Describes the difference in timing between two otherwise similar signals in degree.

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UTILITY

Languages

The software supports English, Spanish, French, Simplified Chinese or Traditional Chinese.

Factory Setting

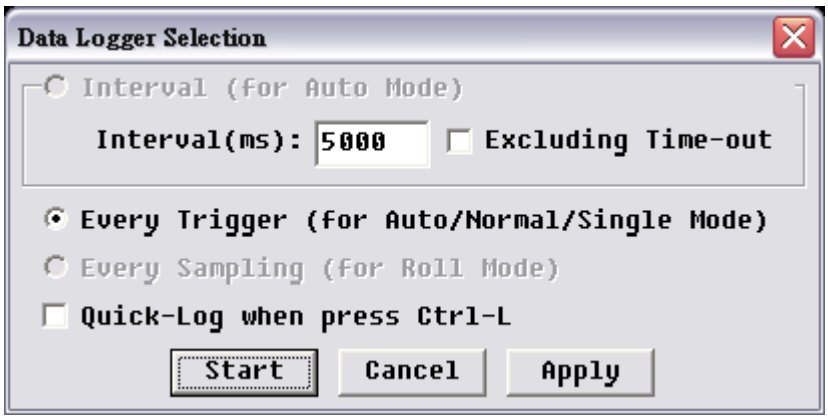
Click the “Factory Setting” button to resume all the setup values back to the factory origins.

Calibration

Click the “Calibration” to calibrate the DSO.

Logger

“Logger” logs the waveform data into the hard disk of the computer; “Logger” has three sub functions: Interval, Every Trigger, and Every Sampling.



Interval (Auto Mode only): “Interval” saves the waveform data in an interval (in tens of milli-seconds at least) that can be defined in setting box and only works in “Auto” mode. “Interval” logs the waveform data whatever in trigger-activated or time-out periods. You may only log trigger-activated waveform by clicking “excluding time-out”.

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Every Trigger (Auto/Normal/Single Mode): “Every Trigger” saves the waveform data when the trigger is activated in either “Auto”, “Normal” or “Single” mode.

Every Sampling (Roll Mode only): “Every Sampling” only works in “Roll” mode (when Time/div >= 200ms) and repeatedly saves the waveform if the hard disk has enough memory depth.

Quick-Log when press Ctrl-L: This is a hot key for logger.

There are two file format: “*.dsow” and “*.log” for “Logger”. *.dsow” is saved as the reference waveform in the QuickSave folder under the installation directory and available for “Interval” or “Every Trigger”; “*.dsow” can be retrieved from the “Save/Recall” function. The Waveform Viewer/Waveform Album software should be used to browse and view multi-“*.dsow” files at the same window.. “*.log” works for “Every Sampling” and can only be retrieved in “Import data” function.

Export data

“Export data” exports the waveform with its setups parameters like Time/div, Volt/div, Channel number and Threshold. The waveform information can be exported in different formats like print out, preview, Word, Excel, CSV, text, Html, clipboard, MATLAB, TSV, WAV.

Import data

“Import data” imports the waveform with its setup parameters. The import waveform can be in different formats like print out, preview, Word, Excel, text or clipboard.

Launch

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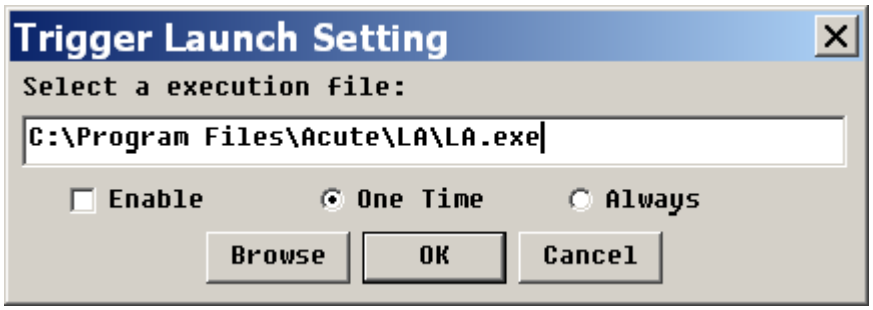

Launch Setting is a sub function under Trigger; it is to launch an external execution file when trigger(s) is activated. Under "Trigger", click "Trigger Launch Setting" and "Enable" to enable this sub function. There are two options for launch setting; "One Time", or "Always". "One Time" means an external execution file will be launched but only one time when the first trigger is activated. "Always" means an external file will be launched every time whenever trigger(s) is activated. Nevertheless, "Always" could result in computer crashed because too many launched external files will take too much memory resources from your PC.

Product Information

It contains information regarding the DSO hardware, software, firmware and production date which are useful in technical support.

Pass/Fail Setting

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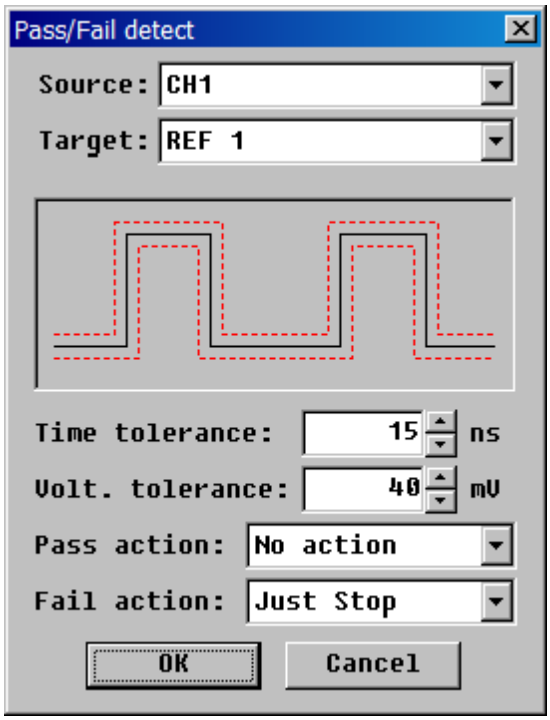

"Pass/Fail" ("Go/No Go") is for auto-test purpose. Use a waveform as reference and set the tolerance range of time and voltage to create a waveform "tunnel", then any waveform is (not) able to goes through the "tunnel" is "Pass" ("Fail"). Setting procedure is as below:

Use "Save/Recall" to show the reference waveform.

Enter "Pass/Fail" dialog box.

Input benchmark tolerance levels for time and voltage.

Set action for "Pass" or "Fail". Sometimes, too many untrue "Fail" events may happen due to unstable (noise) waveforms. You may use the "Average" function or turns on the 20MHz bandwidth limit to filter the unexpected noises.

Hot Key Setting

"Hot Key Setting" is for the production line workers who need to operate the DSO for production purpose. You can undo by CTRL+Z. In the "Hot-Key Setting" dialogue box, you may create "Hot Key" with function(s) or sub-function(s) in "define" list or you can delete "Hot Key" be pressing "Escape". Please be noted that not any function key can be defined as "Hot Key".

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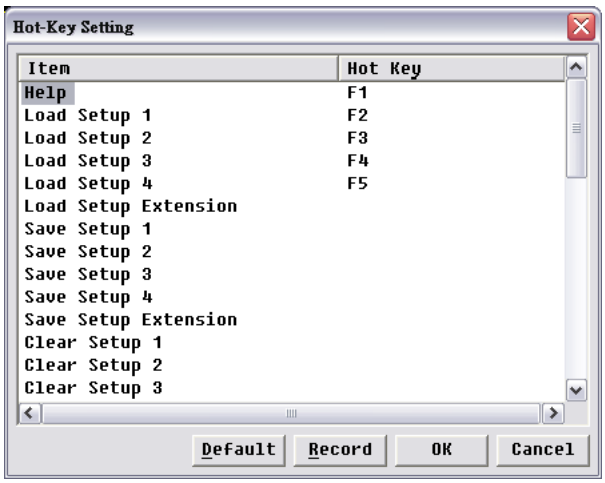

VISA Monitor

VISA is an interface to set or get DSO information and function.

Online Update

The DSO supports online software update. Show in the bottom of main function button.

Customize Configuration

Set the DSO environments like “Channel Color”, “Grid Mode” or “FG setting” etc.

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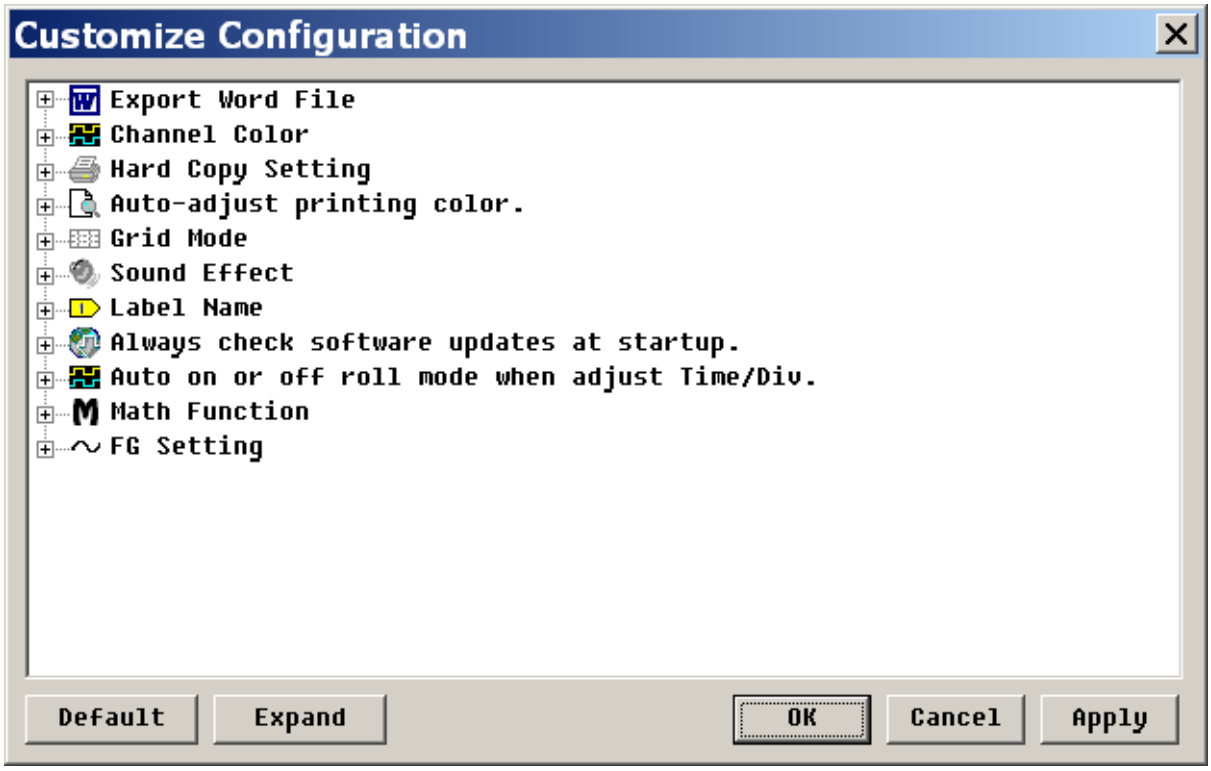

Export Word File: Set the background color (white/black) for the exported Word file.

Channel Color: Set the channel color

Hard Copy Setting: Set the background color (white/black/auto-adjust) for the printed waveform.

Auto-Adjust printing color: Set the background color (white/black/auto-adjust) for the printed waveform.

Grid Mode: There are three types: Dot line, Solid Line or Hide Grid.

Sound Effect: Beep when the trigger succeeds.

Label Name: Enter the channel name.

Always check software updates at startup: Check if there is any newer version software for online upgrade.

Auto on or off roll mode when adjust Time/div.: Check if the sample rate is under 25KS/s, then turn into the roll mode.

Math Function: Show or hide channel waveform when enable math function.

FG Setting: The FG will generate square waveform or the type of waveform set in last time.

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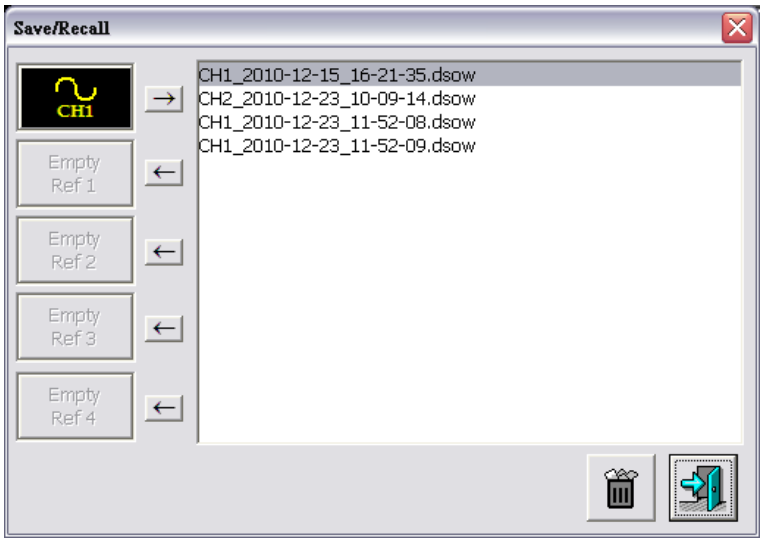
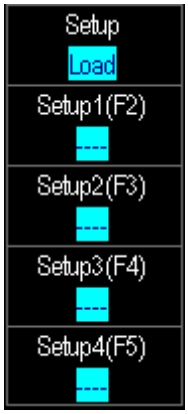
SAVE/RECALL

Reference Settings

You may save the waveforms into files to the “QuickSave” folder throught Save/Recall function. The “QuickSave” folder is located in the DSO installation directory (Windows XP), or User\UserName\Document (Windows 7/8). You may save many waveforms into files, but only up to four waveforms can be recalled to be the reference waveforms at the same time.



Setup



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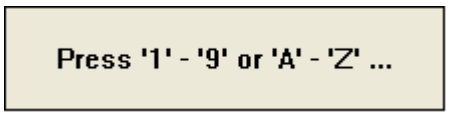
“Setup” can be used to save, load clear parameters like “Time/div”, “Volt/div”, “Ground Offset”, Threshold or “Focus Channel”, … etc. in the four “Setup” keys (hot keys). There are four “Setup” with their own time tag on the software window (see the figure on the right top), but 35 more can be set up in “Hot Key Setting”, “Export data” or “Import data”.



An easy way is to set F7 as the “Save Setup Extension” key in the “Hot Key Setting”, F8 as “Load Setup Extension” and F9 as “Clear Setup Extension”, then you can press F7 to save your setup with 35 choices (1, 2, …,9, A, B,…, Z) to store it, press F8 to load your setup(s) or press F9 to clear the setups.

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ACQUIRE

Acquire

Sample: Create a waveform by saving one sample point during each waveform interval.

Average: Like Sample, except waveform points from consecutive acquisitions are averaged together to produce the final displayed waveform.

Envelope: Similar to Peak Detect, except the minimum and maximum waveform points from multiple acquisitions are combined to form a waveform that shows min/max accumulation over time.

Peak Detect: Save the minimum and maximum value sample points taken during two waveform intervals and uses these samples as the two corresponding waveform points.

Hi-Res: Multiple samples taken within one waveform interval are averaged together to produce one waveform point to have a decrease in noise and an improvement in resolution for low-speed signals.

ADC Bits (TS2212H onlyonly):

	Channels	MAX. sample rate S/s(1Ch/2Chs)	Record length (points)
8 bits	2	1G / 500M	64M
12 bits	2	500M / 250M	32M
14 bits	2	100M / 100M	32M
15 bits	2	100M / 100M	32M
16 bits	1	100M	32M

PS: Hi-Res will not work in ADC 16 bits mode.

Roll Mode: The sampling rate for the DS-1000 series is 1KS/s. and for the TravelScope series is 25KS/s.

FG Setting: The TravelScope has a two-channels (Gen1, Gen2) embedded function

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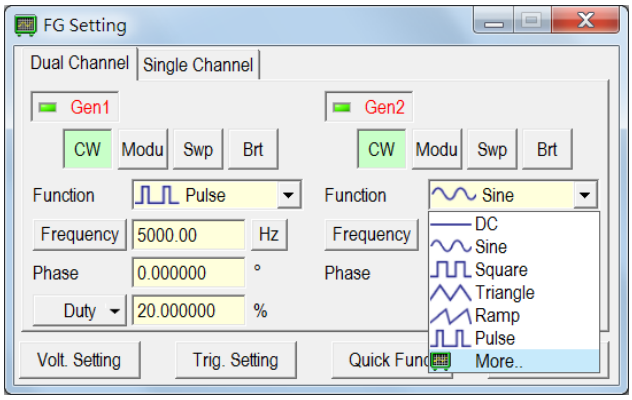
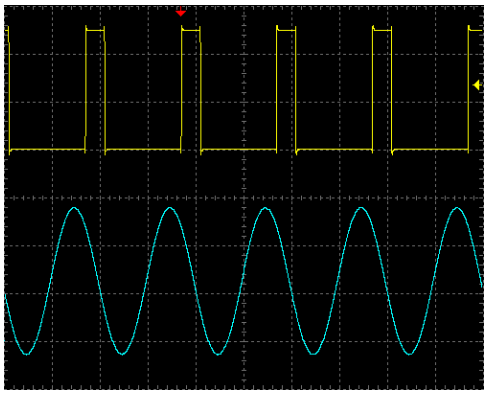
generator.





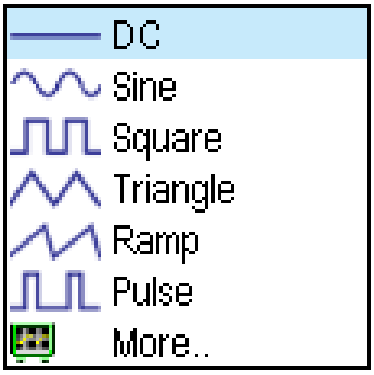
Dual/Single Channel:

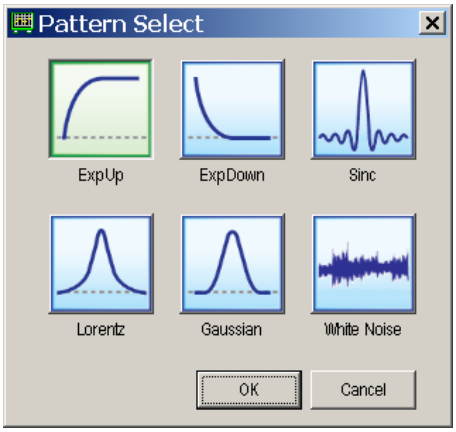
Dual Channel: Gen1 and Gen2 voltage output range is 0 - 2.5 V.

Single Channel: Gen1 disabled, Gen2 voltage output range is -2.5 - 2.5 V.

Gen1/Gen2 button: Enable or disable the output.

Function: Select the signal pattern.





CW (Continuous Waveform): Transmit the signal continuously.

Modu (Modulation): Generate the analog and digital modulation signal.

Swp (Sweep): Vary the frequency of a signal over a specified time period.

Mode:

Repeat Mode: Repeat sweep signals.

Trig. Mode: Sweep a signal after trigger.

Type:

Linear: Sweep a signal in linear frequency.

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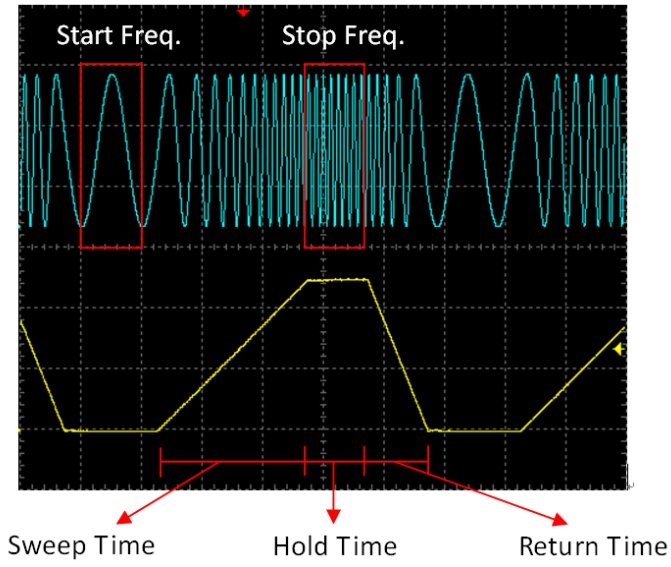
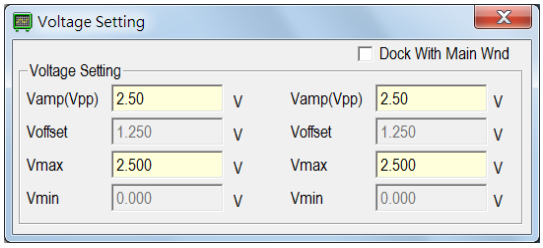
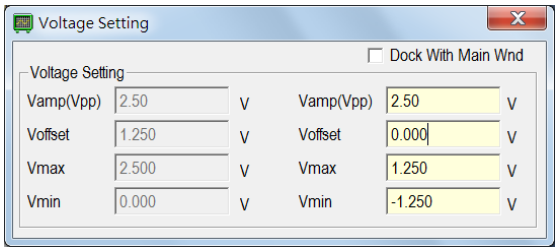
Log: Sweep a signal in exponential frequency.



Brt (Burst): Send Burst signal from time to time.

Voltage Setting:





(Dual Channel Mode) (Single Channel Mode)

Trigger Setting: Trig. Source: Internal or external trigger source which depends on “Swp” and “Brt”.

Quick Func: Save and load the preset waveform.

Sync: Synchronize the two channels (Gen1, Gen2).

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AUTOSET

The “AUTOSET” automatically adjust the voltage, time and trigger parameters to test and measure signal and display the waveform more quickly. “AUTOSET” button, when pushed, will find the parameters of the channel being activated. For example, if the “Channel Switch” button is on CH1, then, the Volt, Time, and Trigger of CH1 signal will be benchmark parameters for “AUTOSET” function.

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Chapter 4 How to stack multiple DSOs

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How to stack multiple DSOs

You can stack multiple DSOs as a multi channels oscilloscope. Use the stack (MCX-MCX) cable to connect the Trigger Output of the master DSO to the Trigger Input of the second (slave) DSO and the same for the second DSO to the third (slave) DSO as shown below.

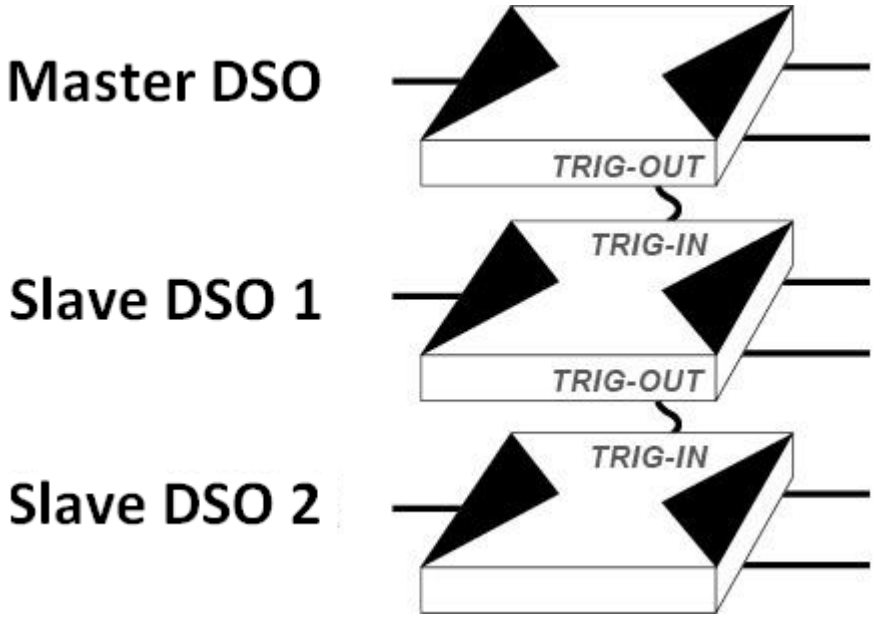
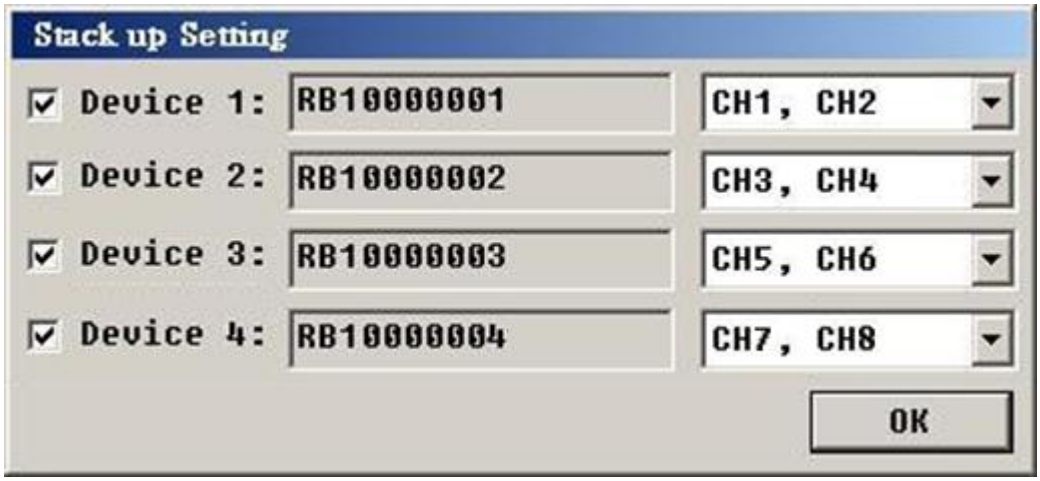


Figure: Stack DSOs diagram

The stack dialogue box displays the serial numbers of the stacked DSOs; CH1, CH2 have been assigned to the master DSO, and the other channels are for the slave DSOs.



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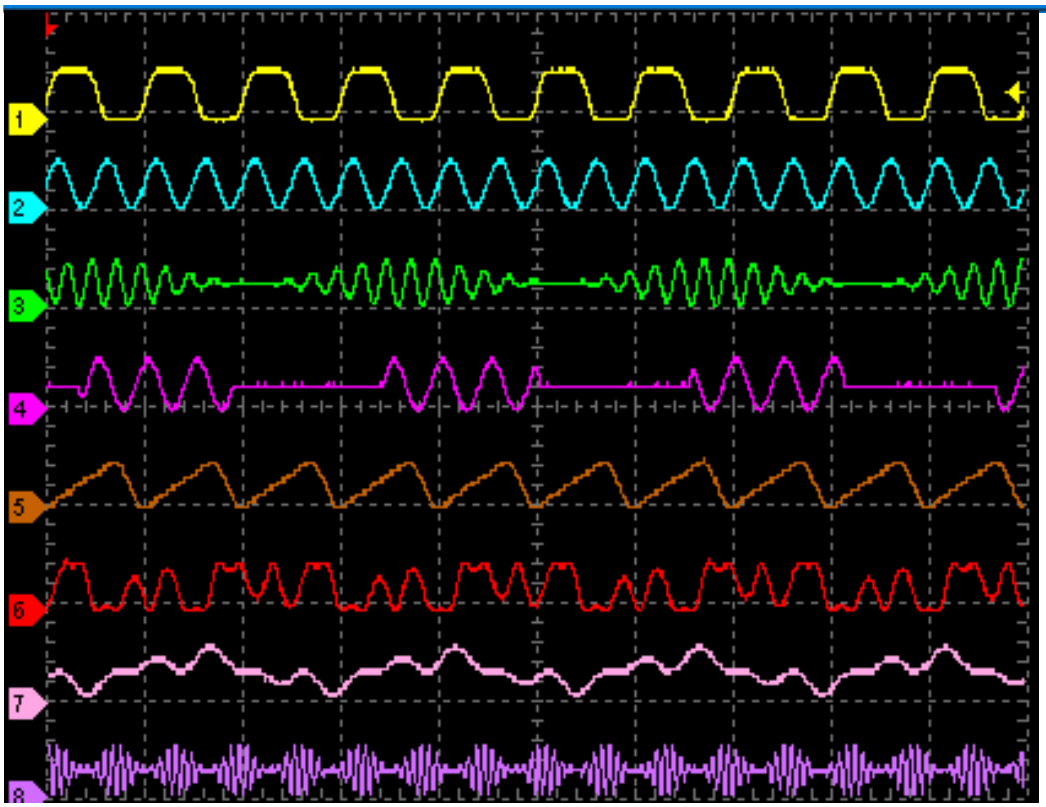

Figure: Stack DSOs softeare view

Limitations in the stack mode:

DS-1000 Series	
Mode	"Roll Mode" is only available for the master DSO.
Sampling Rate	Real time sampling: the same as an individual unit. Equivalent time sampling: only available for the master DSO.
Trigger source	CH1, CH2 or Ex-Trig is only available for the master DSO.
Jitter	+/- 200ps is available for the master DSO; +/- 10ns for the slave DS-1000(s).

TravelScope Series	
Sample rate	Maximum sample rate is 1GS/s for each 1 channel used for each DSO.

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Trigger mode	No pulse width/Video trigger for slave DSOs
Trigger source	CH1，CH2，Ext-Trig (only master)
Skew between devices	±2ns between master and slave DSOs.
Other	When different TravelScope models are stacked, only those TS2202 functions are available.

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APPENDIX

Probe Specification

	Position X 1	**Position X 10**
Attenuation Ratio	1:1	10:1
Bandwidth	DC to 6MHz	DC to 250MHz
Rise Time	58ns	1.4ns
Input Resistance	1M Ohm	10M Ohm when used with oscilloscope with 1M Ohm input
Input Capacitance	47pF plus oscilloscope capacitance	Approx. 17pF

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Digital Storage Oscilloscope Manual

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